

# **FIREFIGHTER II MOD B**

## **Fire Control**

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**2-15 FIRE CONTROL**

- 2-15.1** Identify the considerations for fire stream selection. (3-3.7, 3-3.9)
- 2-15.2** Identify the considerations and technique for a direct attack. (3-3.7, 3-3.9)
- 2-15.3** Identify the considerations and technique for an indirect attack. (3-3.7, 3-3.9)
- 2-15.4** Identify the considerations and technique for a combination attack. (3-3.7, 3-3.9)
- 2-15.5** Identify the fire conditions that require a master stream including: (3-3.7, 3-3.9)
- 2-15.6** Identify key fire control factors for extinguishing or controlling a Class B fire: (4-3.3)
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  - 2-15.6.2** Pressure vessels
  - 2-15.6.3** Tank trucks
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- 2-15.7** Identify the advantages and disadvantages of water when used as an extinguishing agent on Class B fires. (4-3.3)
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- 2-15.14** Identify the basic steps to follow for emergencies in confined enclosures. (3-3.6, 3-3.9, 3-3.18)
- 2-15.15** Identify the term “wild fire”. (3-3.6, 3-3.9, 3-3.18)

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- 2-15.16** Identify the factors affecting wildland fires: (3-3.6, 3-3.9, 3-3.18)
  - 2-15.16.1** Fuel
  - 2-15.16.2** Weather
  - 2-15.16.3** Topography
- 2-15.17** Identify the procedures for attacking wildland fires. (3-3.17)
- 2-15.18** **Demonstrate shutting off the following utility services to a building:**  
(3-3.17(b))
  - 2-15.18.1** Electrical
  - 2-15.18.2** Natural gas
  - 2-15.18.3** LP gas
  - 2-15.18.4** Fuel oil
  - 2-15.18.5** Domestic water

**REFERENCES:**

IFSTA, Essentials, 4<sup>th</sup> ed., Chapter 14.

Delmar, Firefighter's Handbook, copyright 2000, Chapter 19

Jones & Bartlett, Fundamentals of Fire Fighting Skills, 1<sup>st</sup> ed., Chapters 1, 4, 7, 17, 20, & 21

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**2-15 Fire Control**

- I. Identify the considerations of fire stream selection **2-15.1** (3-3.7, 3-3.9)
  - A. Need sufficient amount of water to cool the fuels that are burning.
    - 1. Fire load and materials involved
    - 2. Volume of water needed for extinguishment
    - 3. Reach needed
    - 4. Number of persons available to handle hoseline
    - 5. Tactical requirements
    - 6. Speed of deployment
    - 7. Potential fire spread
- II. Identify the considerations and technique for a direct attack. **2-15.2** (3-3.7, 3-3.9)
  - A. Most efficient use is at base of fire with solid or straight stream.
  - B. Water applied in short bursts until fire "darkens down"
  - C. Water not applied too long to prevent upsetting of thermal layering.
- III. Identify the considerations and technique for an indirect attack. **2-15.3** (3-3.7, 3-3.9)
  - A. Considerations when not to use
    - 1. Victims
    - 2. Where spread of fire cannot be contained to uninvolved areas.
  - B. Fire Stream
    - 1. From outside window or door
    - 2. Could be solid, straight or narrow fog pattern
    - 3. Should be aimed at an upward angle to deflect off the ceiling or other overhead object
    - 4. Placement should provide maximum coverage on the face of the building, taking into account if more than one is in use.
- IV. Identify the considerations and technique for a combination attack. **2-15.4** (3-3.7, 3-3.9)
  - A. Utilizes a steam generating technique of ceiling level attack with a direct attack on burning materials near floor level.
  - B. Nozzle may be moved in a "T", "Z", or "O" pattern.
    - 1. Using a solid, straight, or fog stream
    - 2. Rotating with the stream reaching ceiling, wall, floor and wall

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- V. Identify the fire conditions that require a master stream: **2-15.5** (3-3.7, 3-3.9)
- A. Master streams are deployed:
    - 1. When fire is beyond control of handlines
    - 2. Need for fire streams in location where firefighters are no longer safe
  - B. Positioned to provide an effective stream
    - a. Has to be shut down to move
    - b. Should be directed at the base of the fire
    - c. Angle should be aimed at an upward angle to deflect off the ceiling or other overhead objects
    - d. Should be placed to provide maximum coverage on the face of the building taking in account if more than one is in use
- VI. Identify key fire control factors for extinguishing or controlling a Class B fire: **2-15.6** (4-3.3)
- A. Type of fuel and characteristics **2-15.6.1**
    - 1. Consideration of fuel characteristics
      - a. Solubility of fuel, if any
      - b. Flammable range
      - c. Vapor density
      - d. Toxicity
    - 2. Extinguishing methods
      - a. Smother fuel, cutting off oxygen
      - b. Starve the fuel by removing unburned material from area
      - c. Interrupt the chain reaction process with chemical agents
      - d. Cool the fuel, reducing vapor pressure
    - 3. Firefighter safety
      - a. Do not stand in pools of water or fuels
      - b. Be aware of toxicity and absorption

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**B. Pressure Vessels 2-15.6.2**

1. Must always control ignition sources in a leak area
2. Watch relief valves or piping
  - a. Unless turned off, do not extinguish fires around relief valves or piping
  - b. Don't assume relief valves are sufficient to relieve excess pressures under severe fire conditions
3. Watch for Boiling Liquid Expanding Vapor Explosion (BLEVE): catastrophic rupture of a container when a confined liquid boils and creates a vapor pressure that exceeds the container's ability to hold it

**C. Tank Trucks 2-15.6.3**

1. Similar to pressure vessels
2. Additional dangers
  - a. Increased life safety risks
    - 1) Firefighters due to traffic
    - 2) Motorists
  - b. Reduced water supply
  - c. Difficulty in determining products involved
  - d. Difficulty in containing spills and runoff
  - e. Weakened or damaged tanks and piping
  - f. Instability of vehicles

**D. Utility/pipe lines 2-15.6.4**

1. Type of gas
  - a. Natural
  - b. LPG
2. Local utility must be contacted to provide emergency response crew. Firefighter should not attempt to operate main valves.
3. Firefighter's first concerns are:
  - a. Evacuation and isolation of the area around and downwind of leak
  - b. Elimination of ignition sources

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- c. When approaching the gas service meter for shut-off, firefighters should advance a handline on a wide fog pattern in front of them for protection.
- d. Never extinguish a gas fire unless the supply has been shut off

VII. Identify the advantages and disadvantages of water when used as an extinguishing agent on Class B Fires. **2-15.7 (4-3.3)**

A. Differences between hydrocarbon liquids and polar solvents

1. Hydrocarbon liquids do not mix with water

a. Examples:

- 1) Gasoline
- 2) Kerosene

2. Polar solvents do mix with water

a. Examples:

- 1) Alcohols
- 2) Lacquers

B. Advantages

- 1. Cooling agent for protecting exposures
- 2. Mechanical tool to move fuels to areas where they can safely burn or where ignition sources are more easily controlled
- 3. As substitute medium
- 4. As protective cover

C. Disadvantages

- 1. Water alone is not always effective
- 2. Water can increase production of flammable vapors, greatly increasing fire intensity
- 3. May spread fire over a larger area or towards exposures
- 4. Can increase area and degree of environmental contamination
- 5. If flammable liquid is in a container or in a dike, excessive water may cause overflow
- 6. May not be available in adequate quantities

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VIII. Identify the factors to consider when extinguishing a Class C fire. **2-15.8 (3-3.17)**

- A. De-energizing of applicable electrical equipment
- B. Proper application of extinguishing agents around electric and computer equipment
- C. Water conducts electricity; dangerous to firefighter and/or public
- D. Toxic chemicals used in transmission lines and high-voltage installations
- E. Guidelines
  - 1. Establish a danger zone
  - 2. Guard against electrical shock and burns
  - 3. Treat all wires/lines as energized
  - 4. Do not cut power lines; let power company handle
  - 5. Use electrical lockout/tagout devices
  - 6. Wear full protective clothing and utilize insulated tools
  - 7. Exercise care when raising/lowering ladders, hoselines and equipment near overhead power lines
  - 8. Do not touch vehicle or apparatus in contact with electrical wires
  - 9. Do not use solid or straight streams around energized equipment
  - 10. Be aware of "tingling" sensation in feet. Carbon in boots pick up electrical charges from ground



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- IX. Identify the dangers in extinguishing a Class D fire. **2-15.9 (3-3.17)**
- A. Combustible metals burn at extremely high temperatures
  - B. Many are reactive to water
  - C. **If not reactive to water**, may require application of large enough quantities of water to cool metal below its ignition temperature
  - D. Application of water on extremely hot burning metals may cause a “steam explosion”.
  - E. Usual method is to protect exposures and let fire burn itself out.
  - F. Firefighters cannot assume fire is out just because flame is absent
- X. Identify the tactical components (assignments) for structural firefighting: **2-15.10 (3-3.6, 3-3.8, 3-3.18)**
- A. First due engine company **2-15.10.1**
    - 1. Establishes/initiates incident command
      - a. Advises dispatch and incoming companies of:
        - 1) Exact location
        - 2) Condition at scene
        - 3) Exposures
        - 4) Plan of action
        - 5) Request for additional resources
        - 6) Establishment of two-out team, or need for establishment of two-out team if in rescue mode
    - 2. Initiates fire attack and promotes rescue
      - a. Establish a supply line and initial attack line, if smoke or fire is visible
      - b. Perform search and rescue, if needed
      - c. Intervene between trapped occupants and fire or protect firefighters
      - d. Protect primary means of egress
      - e. Protect exterior exposures
      - f. Initiate extinguishment from the unburned side
      - g. Operate master streams

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- B. Second due engine company **2-15.10.2**
  - 1. Establish additional supply/attack lines, if needed
  - 2. Back up the initial attack line
  - 3. Protect secondary means of egress
  - 4. Prevent fire extension (confinement)
  - 5. Assist in extinguishment
  - 6. Assist with truck/rescue company operations
- C. Truck/rescue company considerations **2-15.10.3**
  - 1. Forcible entry
  - 2. Conduct search and rescue
  - 3. Perform ventilation
  - 4. Control utilities, if needed
  - 5. Place ladders
  - 6. Conduct salvage (property considerations)
  - 7. Check for fire extension
  - 8. Place elevated fire streams
  - 9. Conduct overhaul
- XI. Identify a rapid intervention crew. **2-15.11** (3-3.6, 3-3.9, 3-3.18)
  - A. Teams of at least two firefighters, in full protective gear, to assist other firefighters in emergency situations.
  - B. Determined and assigned by Incident Commander
- XII. Identify the role of the Incident Commander **2-15.12** (3-3.6, 3-3.9, 3-3.18)
  - A. Coordinates the overall activities at the scene
    - 1. Assume command
    - 2. Responsible for constant evaluation of scene
    - 3. Resources are properly assigned and coordinated
    - 4. Calling for additional resources, if necessary
    - 5. Properly terminates the incident

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XIII. Identify the considerations for extinguishing fires in the following: **2-15.13** (3-3.6, 3-3.9, 3-3.18)

A. Upper level/high rise fires **2-15.13.1**

1. Requires additional resources
2. Initial personnel usually responsible for carrying equipment to level of fire
3. Fire attack should be initiated from floor below fire floor
4. Staging area for extra equipment and personnel usually established two floors below fire floor
5. Safety zone established around outside perimeter of building
6. Accountability system

B. Below grade fires **2-15.13.2**

1. Descending stairs simulate chimneys for superheated air and fire gases
2. Ground level floor should be vented to remove heat and smoke from below grade fire
3. Should have other engine/truck company locate heavy objects above fire.
4. Consider vertical means of fire spread

C. Vehicle fires **2-15.13.3**

1. Attack line should be at least 1½ inch hoseline
2. Fire should be attacked from the upwind/uphill side
3. Backup line should be deployed as soon as possible
4. Full PPE including SCBA

D. Trash containers **2-15.13.4**

1. Contents may be hazardous materials, plastics, batteries, or aerosol cans
2. Size of fire determines size of hoseline
3. Protect exposures to fire scene
4. Full PPE including SCBA

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XIV. Identify the basic steps to follow for emergencies in confined enclosures. **2-15.14** (3-3.6, 3-3.9, 3-3.18)

- A. Recognition of inherent hazards of the confined space
  - 1. Atmospheric conditions
  - 2. Limited means of entrance and egress
  - 3. Cave-ins or unstable support members
  - 4. Deep standing water or other liquids
  - 5. Utility hazards
- B. Establishing Command Post and Staging Area
  - 1. Staging area
    - a. Near entrance, but not obstructing it
    - b. Supplied with personnel and equipment to be used
    - c. Safety Officer stationed at entrance to keep track of personnel and equipment entering and leaving
    - d. Firefighters do not enter until IC gives orders
      - 1) Must wear SCBA
      - 2) Lifeline should be tied to each rescuer
      - 3) Communication system must be established between inside and outside members
        - a) OATH method (using rope)
          - i) O = OK, 1 tug on rope
          - ii) A = Advance, 2 tugs on rope
          - iii) T = Take-up, 3 tugs on rope
          - iv) H = Help, 4 tugs on rope
- C. Air monitoring
  - 1. Atmospheric monitoring systems used to determine:
    - a. Whether rescuer(s) may enter confined space
    - b. What type and level of PPE is required
    - c. Likelihood of finding viable victims
  - 2. AMS should be removed and re-calibrated on schedule determined by AHJ

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D. Accountability

1. Checked and recorded by Safety Officer
  - a. Member
  - b. His/her mission
  - c. His/her tank pressure
  - d. Estimated working time

E. Fire Attack time

1. Heat and exhaustion limits firefighter time

XV. Identify the term "wildland fire". **2-15.15** (3-3.6, 3-3.9, 3-3.18)

A. Large campaign ground fires classified by fuels:

1. Subsurface fuels: Roots, peat, duff, and other partially decomposed organic matter that lie under the surface of the ground.
2. Surface fuels: Needles, twigs, grass, field crops, brush up to 6 feet in height, downed limbs, logging slash, and small trees on or immediately adjacent to the surface of the ground.
3. Aerial fuels: Suspended and upright fuels (brush over 6 feet, leaves and needles on tree limbs, branches, hanging moss, etc.) physically separated from the ground's surface to the extent that air can circulate freely between them and the ground.

B. Parts of wildland fires

1. Origin
2. Head
3. Finger
4. Perimeter
5. Heel
6. Flanks
7. Island
8. Spot fire
9. Green
10. Black

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XVI. Identify the factors affecting wildland fires: **2-15.16** (3-3.6, 3-3.9, 3-3.18)

A. Fuel **2-15.16.1**

1. Small or light fuels burn faster
2. Tightly compacted fuels (subsurface or surface) burn slower than the aerial types
3. Fire spreads faster when fuels are close together, but fire spreads unpredictably when fuels are patchy.
4. Amount of fuel determines fire's intensity and amount of water needed for extinguishment.
5. Moisture content of fuel determines ignition factor and intensity of burn

B. Weather **2-15.16.2**

1. Wind
  - a. Fans flames and supplies fresh air
  - b. Some medium and large sized fires can produce their own winds.
2. Temperature
  - a. Effects wind
  - b. Closely related to relative humidity
  - c. Affects the fuels as a result of long-term drying
  - d. Relative humidity: impacts fuels with no moisture content of their own
  - e. Precipitation:
    - 1) Dead flashy fuels dry out more quickly
    - 2) Large dead fuels retain more moisture and burn slower

C. Topography

1. Steepness of slope affects rate and direction of wildland fires
2. Aspect:
  - a. Determines effects of solar heating
    1. Southern exposures (north of equator) receive more of sun's heat and burn faster
3. Local terrain features

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- a. Obstructions (ridges, trees and large rock outcroppings) may alter airflow and cause erratic fire behavior
- 4. Drainages
  - a. Create turbulent updrafts causing a chimney effect.

XVII: Identify the procedures for attacking wildland fires. **2-15.17 (3-3.17)**

- A. Revolve around perimeter control
- B. Control line may be established to completely encircle the fire with all fuels inside rendered harmless.
  - 1. At burning edge of fire
  - 2. Next to burning edge of fire
  - 3. Considerable distance from fire
- C. Direct attack
  - 1. Action taken directly against flames at its edge or closely parallel to it.
- D. Indirect attack
  - 1. Line is constructed some distance from fire's edge and unburned intervening fuel is burned out.
- E. Size up must be continued during fire due to fire unpredictability and adjustments made.

**XVIII: Demonstrate shutting off the following utility services to a building: 2-15.18 (3-3.17)**

**Utilities shall be shut-off or secured in accordance with the policies and procedures of the AHJ or within guidelines of the local utilities.**

- A. Electrical **2-15.18.1**
- B. Natural gas **2-15.18.2**
- C. LP gas **2-15.18.3**
- D. Fuel oil **2-15.18.4**
- E. Domestic water **2-15.18.5**